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The temporalities of financialization. Infrastructures, dominations and openings in the Thames Tideway Tunnel

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Abstract: In the last decade, a burgeoning body of literature has explored the influence of financial actors, techniques and motives in the urban development of North American and European cities. Less has been said about the influence of finance on the temporalities of urban production and urban life. Yet finance is, at its most basic, the management of debt; and debt is, simply put, the deferral of payment; thus, by its very nature, financialization introduces new temporal dynamics into whatever object of investment it engages with. This paper examines these temporal dynamics in the financialized production of a large-scale urban infrastructure project, the Thames Tideway Tunnel (TTT), a 25-km 'super-sewer' beneath the River Thames where it runs through the center of London. From analyzing how financial actors, motives, and instruments influence the planning and implementation of this massive sewer expansion, it traces the ways in which the temporal characteristics of finance have repercussions in the urban space that privilege financial interests. This analysis contributes both conceptual and empirical insights. Firstly, it provides a theoretical conceptualization of the ways in which the temporalities of financialization shape the material production of the city. Secondly and more empirically, our case analysis allows us to schematize the different ways in which the financialization of the TTT project shapes the temporalities of its production, with wide-ranging political, economic and environmental implications. In summary, the paper closes a crucial gap in understanding how different temporalities of finance intersect in the making of contemporary cities.

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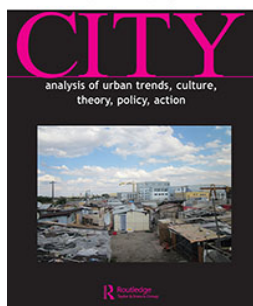


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The temporalities of financialization

Infrastructures, dominations and openings in the Thames Tideway Tunnel

Fritz-Julius Grafe  and Hanna Hilbrandt 

In the last decade, a burgeoning body of literature has explored the influence of financial actors, techniques and motives in the urban development of North American and European cities. Less has been said about the influence of finance on the temporalities of urban production and urban life. Yet finance is, at its most basic, the management of debt; and debt is, simply put, the deferral of payment; thus, by its very nature, financialization introduces new temporal dynamics into whatever object of investment it engages with. This paper examines these temporal dynamics in the financialized production of a large-scale urban infrastructure project, the Thames Tideway Tunnel (TTT), a 25-km ‘super-sewer’ beneath the River Thames where it runs through the center of London. From analyzing how financial actors, motives, and instruments influence the planning and implementation of this massive sewer expansion, it traces the ways in which the temporal characteristics of finance have repercussions in the urban space that privilege financial interests. This analysis contributes both conceptual and empirical insights. Firstly, it provides a theoretical conceptualization of the ways in which the temporalities of financialization shape the material production of the city. Secondly and more empirically, our case analysis allows us to schematize the different ways in which the financialization of the TTT project shapes the temporalities of its production, with wide-ranging political, economic and environmental implications. In summary, the paper closes a crucial gap in understanding how different temporalities of finance intersect in the making of contemporary cities.

Key words: Financialization, temporalities, infrastructure, Thames Tideway Tunnel, urban development

Introduction

Since the 2008 global financial crisis, research has explored the nexus of urban production and financialization and a number of crucial effects thereof, including the deepening of socio-economic inequalities (Christophers 2012; Fields and

Uffer 2016; Aalbers 2017; Wijburg and Aalbers 2017) and the reorganization of institutional and regulatory frameworks (Savini and Aalbers 2016). Less has been said about the influence of finance on the temporalities of urban production, yet its effects on urban development are substantial and direct. At its most basic, finance is

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defined by time: As the management of debt, i.e. the deferral of payment, finance is, in temporal terms, the present provision of funds by a commitment to future dependencies. Temporal dynamics resulting from such debt management include cycles of boom, bust, and crisis, the routine of dividend payouts, the long-durée of aspiration and the risky futures of speculation. It becomes obvious that finance introduces a whole slew of temporal dynamics into the equation of how, when, why and where investment in the urban fabric is prone to take place. Commonly understood as ‘the increasing role of financial motives, financial markets, financial actors and financial institutions in the operation of domestic and international economies’ (Epstein 2005), *financialization* can—in temporal terms—thus also be understood as the increasing dominance of finance in the definition of temporal relations. Differently put, financialization implies the ascendance of particular timescales of dividend-payout, cost calculation, or investment decisions. Understanding the ways in which these temporal specificities shape the production of urban space is crucial in two ways.

Firstly, it contributes to a theoretical conceptualization of the ways in which the temporalities of financialization shape the material production of the city. Time and temporalities have long been understood to be socially constructed (Wajcman 2008; Hope 2010, 2011; Barak 2013; Ogle 2013). In this sense, the social is governed by multiple temporalities—different rhythms, timescapes or conceptions of past and future—that hardly play out in coherent ways. Rather, the ways in which temporalities manifest themselves depend on the power relations that sustain dominant regimes of time. In line with the approach of this Special Feature, we employ the notion of infrastructure to describe the constitution and structuring logics of temporalities and their interactions (see Besedovsky et al., this issue). From this perspective, temporalities constitute

infrastructures yet transcend the usual metaphorical and conceptual understandings of these: underlying social interaction, temporalities as infrastructures pre-figure and mediate social life. Through connections, patterns and path dependencies they enable or constrain practices, thereby perpetually reproducing existing power relations (Angelo and Calhoun 2013; Angelo and Hentschel 2015); yet, constructed through social practices, temporalities can be disrupted, leading to either standstill or change (cf. Star and Ruhleder 1996; Angelo and Calhoun 2013). In untangling some of the ways in which the temporal logics of finance define this temporal infrastructure, for instance through industry-specific timescapes or forms of forecasting the future, and linking these to resulting reconfigurations of the urban production, our analysis offers novel ways of theorizing the nexus of time, finance and space.

Secondly, the paper elaborates a more precise empirical understanding of the workings of these temporalities, providing further insights into possibilities for intervention and change. In this vein, this paper analyzes the financialized production of a £4.2 billion¹ urban infrastructure project, the Thames Tideway Tunnel (TTT), also known as the ‘super sewer.’ This 25-km tunnel is situated where the River Thames runs through London and is intended to solve the city’s wastewater problems by retaining sewage that presently overflows into the River Thames. Thames Water (TW), London’s water provider and central actor in the development of the sewer project, is owned by a multinational consortium committed to the regular generation of dividends for its investors (Allen and Pryke 2013) and provides a textbook example of today’s financialized landscape of urban infrastructure provision (see also Loftus and March 2019 for an analysis of the rent extraction scheme of the Tideway Tunnel).

In bringing these aims together, our case analysis points toward five critical and

entangled temporal dynamics that characterize how financialization impacts urban development: first, the alignment of opportunities to create new trajectories in favor of financialization, for instance in the concurrence of market dynamics and moments of political opportunity; second, the pre-emptive extraction of profits for the future provision of services; third, the active construction of new temporalities that set the stage for other urban processes (e.g. regular dividends, interest payments, regulatory cycles, etc.); fourth, economically framed projections of the future that skew decision making towards economic rationales; and fifth, moments in which existing temporalities are put under strain and create frictions with other temporalities whose logic diverges from that inherent to the project. These dynamics allow us to detail how the structural set-up of the financial framework favored finance's temporal needs within the complex equation of urban infrastructure provision. Yet while these factors dominate the development process, our conclusion also points to openings for change.

The paper builds on the analysis of legislative and planning documents, expert reports and legal frameworks issued between 2001 and 2017. We understand these documents as interacting—at times competing with or explicitly counteracting—a web of public discourse in the media, blogs and other publications that we also took into consideration (Colomb 2012, 31). Following Sayer (2005, 7), the analysis accounts for the ways in which documents tend to deliberately play towards particular ends as ambiguous tools that may represent vested interests. The analysis focused on documents that concerned the financing of the tideway tunnel, its possible effects and the contestations thereof, leaving aside any material on other alternative wastewater projects. We analyzed the data regarding the temporal logics inserted through financialization as well as other—possibly contradictory—temporal dynamics, to discern temporal patterns or conflicts and derive analytical categories thereof. Based on these categories, we re-examined

the material in order to test our observer impressions. We backed up the analysis of these documents through interviews, conducted between 2017 and 2018, with financial experts involved in both the development and critique of London's water infrastructure.

Financial markets, temporalities, and urban development

In the last decade, a burgeoning body of literature interested in the particular *urban* effects of financialization (Heeg 2013; Savini and Aalbers 2016; Aalbers 2017) has investigated the financialization of land (Kaika and Ruggiero 2016; Aalbers and Haila 2018), material infrastructure (Torrance 2008; O'Neill 2013; Loftus and March 2016), housing and real estate (Aalbers 2017), as well as urban redevelopment processes (Rutland 2010; Weber 2010). While we do not discuss this literature in detail, an indication of some of its key themes is useful. This body of work describes new financial technologies and instruments that help global capital to secure profitable outlets and also function to assess or minimize risk (Bitterer and Heeg 2012; David and Halbert 2014); it demonstrates how financialization has shifted power relations in urban and national governance (Weber 2010; Ashton, Doussard, and Weber [2014] 2016); documents the emergence of a 'shareholder-value maximization' credo (Froud et al. 2000; Pike 2006) that seeks to maximize the exchange-value of underlying assets as opposed to their use-value (Clark, Larsen, and Hansen 2015); and captures the impacts of financialization on everyday life (Martin 2002; French and Kneale 2009), for instance in housing struggles (Bojadžijev 2015; García-Lamarca and Kaika 2016; Kaika and Ruggiero 2016) or the effects of financialized water provisioning (Allen and Pryke 2013). While some of this literature touches upon the role of time (notably, Martin 2002; Graham and Thrift 2007; Weber 2010), current analyses are limited in that they do not explicitly reflect the temporal dimension of financialization (but see Kloeckner and

Mueller 2018). Yet, as this paper shows, financialization not only impacts upon the characteristics of time, but finance's temporal effects have further repercussions in urban space. This aspect is particularly crucial when it comes to urban infrastructure with its long operational timescales and immediate impacts on urban life.

The production of temporalities

The temporal effects of finance are usefully contextualized in literatures that problematize the social construction of time. Despite recurring complaints regarding the neglect of the temporal dimensions in urban analysis, the 19th century saw a wide and interdisciplinary engagement with multiple understandings of time (Nowotny 1992). These include Marxist analysis, in which time emerges as a central category in capitalism's endeavors to speed up, compress time and increase productivity (Thompson 1967; Harvey 2008), geographical analysis of the nexus of space and time (Hägerstrand 1978; May and Thrift 2001; Cresswell 2004; Massey 2005), sociological accounts of time and its significance in social interaction (Elias 1992), an economic psychology of time (Mieg 2005), as well as anthropological accounts of diverse cultural conceptualizations of time (Adam 1994; Fabian 2002).

This literature has recognized that temporality does not impose itself on society, but emerges in social practice (Wajcman 2008). Consequently, time is socially experienced, thus 'multiple and heterogeneous' (May and Thrift 2001, 3), while it similarly 'involve[s] and invoke[s] our relations with others in time' (Keightley 2012, 202). Social time is, in this 'practiced' sense, not only relative and relational, it is also open to change through adaptation, appropriation and negotiation, while also being determined by path dependencies, on the one hand, and on the other by power relations emerging from different temporal interests. Here, we speak of temporalities in its plural form, to refer

to the social experience of time-lived practices and perceptions, hence to differentiate *temporalities* from the abstract notion from time as a 'physical' externality (LiPuma 2017, 145).

Adam (2007) understands the power relations of capitalism to have led to specific temporalities that have, in turn, fundamentally shaped contemporary social relations. While industrial capitalism was fundamentally shaped by the dominance of clock time as the central measure of productivity (Thompson 1967), in the 1970s and 1980s the onset of global electronic communication transcended 'the durational and sequential properties of clock time' (Hope 2010, 2011). Key concepts emerging to understand this new era, such as Castells' 'network society' (Castells 2010), Urry's 'mobility paradigm' (Urry 2000), and Sassen's 'global city' (1991), describe the ways in which interconnections between people across space (May and Thrift 2001, 10) define new temporalities.

The temporalities of financialized capitalism (Hope 2006) are critically determined by these global, technological connections that underpin the workings of most financial practices. For instance, as Hardin (2014, 205–206) writes, forms of prognostication collapse 'the future into the now' (cf. Searle 2016, 53). 'In a virtual sense,' Hope (2010, 652) notes, 'the future is pulled into the present (to be assigned a monetary value).' Crucially, such modeling transforms the future, as it 'steers towards or away from certain outcomes... under the guise of merely trying to anticipate them' (Orpana 2017, 77–78; see also Riles 2004, 2011). In addition, financial capitalism is 'future exploitative' (Orpana 2017), i.e. transferring risk to the future (Hardin 2014, 102), predominantly the futures of urban inhabitants who are frequently unaware of the risks they are required to bear (see also Bear 2011; Allen and Pryke 2013, 427). Moreover, financial markets, in particular derivatives markets, trade in future uncertainty, whereby risk 'becomes a necessary resource for technologized derivatives trading and a constitutive feature of the real-time present'

(Arnoldi 2004, 106–107). By speeding up or compressing time, technology allows markets to ‘reduce or eliminate sequential lags of time’ (Hope 2010, 653), thereby gaining more profit in shorter periods of time. These short-term dynamics have shaped long-term change through the aggregate effects of these technologies in financial markets. This is most evident in shifts in market cycles (e.g. Kondratiev waves, Schumpeter’s business cycles and cycles of financial crises) and related financial crises.

Few authors have discussed the effects of these temporal changes on the built environment. Yet, as financial markets have become more integrated into the production of the built environment, the temporalities of these cycles of ‘boom, bubble, and bust’ (Weber 2015, 23) have been mediated through urban space. Most prominently, David Harvey has described capital’s search for new markets through the notion of ‘the spatial fix’: short-term relief from crisis of overaccumulation, in which investment in the built environment absorbs surplus value (Harvey 2003, 115–116). Temporally speaking, the effect of these fixes implies that cities are changing at ever faster pace—i.e. the pace of the market (Weber 2015, 17). Yet, the spatial fix is also a temporal fix, because crises are pushed just slightly further into the future. The needs of finance thereby drive the building cycle (Weber 2015, 19) through periods of ‘expansion, slowdown, a downturn, and a recovery’ (ibid: 25).

Yet, to date, empirical evidence has not unearthed the interactions between multiple temporalities at play and their repercussions in urban space. To fill this gap, the remainder of this paper contributes a temporal analysis of the TTT that enables us to outline the different ways in which the financialization of this infrastructure project shaped and continues to shape the temporalities of its production. We thereby pursue the argument that the dominance of financial actors and motives introduced a whole slew of new temporal logics, interests and dynamics into the equation of how, when, why, where and to

whose advantage investment in the urban fabric is prone to take place. The Tideway Tunnel poses an ideal research subject for this endeavor, being characterized from inception to execution by a multitude of tropes that exemplify the financialization of urban infrastructures in contemporary cities.

The financialized temporalities of the TTT

First, a word about the tunnel’s aims, history and governance structure. The Thames Tideway Scheme is an ongoing large-scale urban infrastructure project that seeks to prevent the discharge of sewage overflows into the River Thames, by constructing a 25-km tunnel to serve as a temporary storage facility.² The discharge of untreated sewage into the river led the European Commission to sue the UK in 2009 under the 1991 Urban Waste Water Treatment Directive. In 2001, well before these judicial actions were set in motion, the UK Environment Agency, Thames Water (TW), the Department for Environment, Food, and Rural Affairs (Defra, the responsible ministry), and the Greater London Authority instigated the Thames Tideway Strategic Study to evaluate the impacts of the discharges and potential solutions to the problem.³ Following this study, the Thames Tideway Scheme moved forward with a three-tiered approach to achieving improved sewage screening, storage and treatment: First, a deep storage and conveyance tunnel was constructed; second, London’s sewage treatment works are to be modernized; and third, the construction of the Thames Tideway Tunnel (TTT), the focus of this paper.

The principle responsibility for this project lies with TW. Similarly to other water utilities in the United Kingdom, TW was privatized during a period between the late 1980s and early 1990s. Subsequently, several takeovers have resulted in over-leveraged balance sheets. As these weigh heavily on the company’s ratings, the tunnel is being constructed by a separate entity, Bazalgette

Tunnel Limited (BTL). Although this new special-purpose company with an offshore holding structure similar to that of TW is legally and financially separated from TW, both companies are in fact tightly entangled, with TW being both the supplier and customer of BTL. TW and BTL are regulated by the regulatory body Ofwat (Water Services Regulation Authority), whose main responsibility lies in the management of licenses and the negotiation of tariffs every five years. However, TWs byzantine corporate structure complicates political oversight, obscures the final responsibility over the project and widens the disconnect between TW's 13 million customers, its owners, and the utility. The primary investors in BTL are Allianz, IPP, Swiss Life, Dalmore Capital, and DIF. These insurance companies, pension funds and infrastructure funds specialize in low-risk, low-volatility long-term investments as a means of harboring their clients' assets for longer periods of time. Shareholder value and quarterly reports are core metrics that drive their decision-making. Tax optimization structures and maximizing of financial benefits are routine practice.

The involvement of local government and the public was scant, as the responsibilities were immediately referred to Ofwat and TW following the EU lawsuit.⁴ Participation was limited to minimizing the impacts on boroughs by means of managing construction sites. Most Londoners are not aware of the added costs already appearing on their water bills (interviews Jan. 2018). An exception is the initiative '*Clean Thames Now and Always*,' which coordinates efforts to question the long-term sustainability of the project vis-à-vis other solutions, such as sustainable urban drainage systems (SUDS).

How the temporalities of finance shaped the TTT

To consider how 'financialized temporalities' shaped the project, it is crucial to recall the

developments that brought the project about: The pressure on the UK Government by the previously mentioned EU lawsuit coincided with the fallout from the financial crisis and ensuing austerity policies, limited availability of bank loans and TW's financially weak position. Hence, multiple temporal dynamics came together in ways that facilitated financialization. In this moment, only the financial construct described above appeared to appease wary investors, while at the same time promising them significant returns and solving the underlying problem of raw sewage discharges. Consequently, the project was brought about hand in hand with crucial conflicts of interest bound up in the project, and the desires of powerful actors to capitalize upon large-scale development. The opportunistic nature of financialization to capitalize on the alignment of different developments and timelines at opportune moments to create new trajectories can be defined as a first critical characteristic of the temporal impacts of financialization. This alignment led to the sudden transformation of a development with severe consequences for other temporal dynamics.

Once momentum was gained, the inherent logic of finance dictated the preference of large-scale, ring-fenceable, technocratic measures with particular temporal effects. As previously noted, establishing BTL enabled the sewer project to be kept separate from TWs heavily leveraged balance sheet, through complex financial engineering that ring-fenced its profits separately from the wider risks of the project (cf. Allen and Pryke 2013). Thus, limiting interactions with existing urban infrastructures also made the project easier to quantify, project, securitize and trade, and defined the type of project that was to be constructed.⁵ Debt obligations required the creation of revenue streams while the project was being completed. In the resulting model (revenue increment financing / cash flow financing), customers thus pay during both the construction period as well as during service delivery.

As Allan and Pryke helpfully note, in this model ‘it would seem that the households themselves are the financial asset’ (2013, 419). This not only contradicts common investment principles, it also transfers the project’s completion risk from the utility to the customers (Blaiklock 2017). Both the securitization of revenue streams, as well as adding the costs of the project to customers’ bills, enabled a structure that largely benefited investors over customers. To understand the temporal specificities of the project, it is critical to emphasize that water consumers do not (yet) profit from the effects of the project; they are thus paying for a project that they might not even benefit from, while shareholders are already receiving payouts from their revenue streams. This preemptive extraction of profits for future services defines the second critical characteristic by which the temporal impacts of financialization influence the production of urban space.

Investing large amounts of resources in this project created path dependencies, thereby structuring future possibilities for intervention. Once various actors committed to long construction periods, the TTT became dependent on pricing volatility and other market dynamics. In particular, the seven-year (or more) construction period does not allow for ‘fixed price construction contracts,’ as construction companies cannot anticipate price fluctuations for materials and labor over such an extended period of time; this thus exposes the project to cost inflation (Blaiklock 2017, 16). Blaiklock, an infrastructure banking expert, concludes: ‘the incentive for contractors to achieve project completion to time and cost is now much diminished, if not eliminated’ (Blaiklock 2017, 4), with significant implications for the future temporal dynamics of the project. The financialized production-logic of the TTT thus established routines, repetitions, and timeframes that constitute new temporalities, which in turn set the stage for other urban processes. This is the third critical characteristic of the temporal impacts of financialization. This logic

of structuration of time also becomes apparent in the ways in which the model is legally regulated: it is mostly structured around financial objectives rather than those of the public. For instance, one of the case’s prominent legal frameworks is the RAB Model (Stern 2014), which Ofwat uses to calculate TW’s value in the tariff-setting process. It is the central mechanism that informs negotiations in the five-year tariff-setting cycle and thus defines the political influence that regulators can wield over the license holder.⁶ The legal framing and toolset of the regulator thus establishes a temporal time-frame in which windows of intervention are possible, but only based on the calculative model employed, which by its own merits fails to look beyond solely economic projections of the future.

The ways in which dominant interests designed the project externalized costs not only into the future but also onto unwitting customers. Furthermore, it also dictated the duration of the project: namely for as long as it would serve the interests of the shareholders. As the perception of the future was thus entirely described in financial terms, the project’s time horizon disregarded considerations of the future beyond the logic of financial calculus. Crucially, in this way financial interests foreclosed long-term sustainability dynamics, thereby side-stepping considerations of climate change and potential flooding during the project setup and instead shifting their resolution onto future generations. As alternative technologies such as sustainable urban drainage systems (SUDS)—which would have been much more attractive in this regard—are less easily financialized, they were hardly considered as options in the largely investor-driven process. This correlation not only points to a general weakness concerning the financialization of climate change in the urban realm, it also highlights the discrepancies between the time horizons of financial actors and those of the general public (Clean Thames Now and Always 2017). This skewing effect of economically defined

long-term expectations and modeling mechanisms of the future is a fourth critical characteristic of the temporal impacts of financialization. In the present case, this is evident in the ways in which finance informs decision making about the future through current strategies of profit maximization.

The project construction phase began in 2016 and is to conclude in 2023. Projections made about the scheme were quickly outdated, putting the overall rationale of the project in question: The Thames Tideway Strategic Study of 2006 calculated the capital cost as £1.7 bn, projecting economic benefits of £3–5 bn. As Blaiklock notes, ‘this presented the best answer to the problem within the technologies available *at the time* [emphasis added]’; however, ‘by 2012 it had become clear that TW could not fund TTT from its own resources, unless it strengthened its balance sheet by issuing more capital’ (Blaiklock 2017, 9–10), an option rejected by TW. In 2016, Prof. Chris Binnie, former chairman of the Thames Tideway Strategic Study, argued that ‘TTT was arguable not now needed.’ As the UK Government now emphasizes SUDS under the Flood and Water Management Act 2010, TTT appears to become redundant a decade after its projected completion date (Blaiklock 2017, 10). This quick change of calculus provides a crude demonstration of how the logic of financial modeling that set the stage for the project obscures not only its long-term pricing uncertainty (falsely suggesting that future costs would be calculable), but also the possibility of finding alternative solutions.

Similarly, critics point out that differing amounts of resources have been allocated to researching potential alternative strategies and note the lack of any updated research since the initial study; and that uncomfortable, independently derived insights that question the need for the project as a whole have been brushed aside (Thames Blue Green Economy 2016; Blaiklock 2017). As this critique coincided with the notice of the

possible obsolescence of the project in 10–12 years, public debate has recently gained some momentum. It is during these moments that the entire temporal logic of the project and its underlying financial mechanisms are drawn into question. Here, perhaps, the temporalities of the project might come under duress.

This friction between the project’s inherent temporalities and those that are defined by external expectations and mechanisms point to a final critical characteristic of the temporal impacts of financialization. The temporalities of financialization are defined by conflicts with, and disruptions to, the continuous reproduction of established temporalities. This is frequently a result of polychronie, the plurality of temporalities and their interactions and conflicts with each other. These disruptions open windows for social change, for instance when protests and political activities align with windows of opportunity during periods of disruption, as this volatile state lends itself to readjustments. To identify and act upon these windows of intervention, it is crucial to (re-)claim public and analytical oversight of the development of such projects.

Conclusion

Although multiple temporal dynamics are at play within the project, we identified five critical characteristics of the temporal impacts of financialization on—and through—the production of the TTT. *First*, the alignments of opportunities in the ‘right’ or ‘critical’ moment as a staging point for the expansion of financialization, here, for instance, in the push for large-scale financialized projects; *second*, the pre-emptive extraction of profits for future services from London’s inhabitants; *third*, the quality/ability of finance to pre-structure further temporalities, for instance those of regulatory models; *fourth*, the ways in which finance defines expectations of the future; and

finally, moments of friction and disruption between different temporalities. These critical characteristics provide a stepping-stone towards a better understanding of the temporal impacts of financialization. In jointly considering these temporal characteristics, our conclusion draws wider insights from the analytic proposition of this Special Feature and explores the infrastructural qualities of the outlined temporal dynamics. These dynamics act together in polychronie. Like any infrastructure, this polychronie creates and maintains habits by establishing and reinforcing patterns, yet as it forecloses certain pathways, it also creates openings.

In pointing to moments of closure, the inherent logic of finance dictates the preference of large-scale, ring-fenceable technocratic measures involving only limited interactions with existing urban infrastructures, which during the project initiation phase skew public oversight and tend to be presented as the only feasible solution. This is the critical phase for intervention, since obligations are put in place and resources committed once the financial framework is settled. Akin to a large container ship, it is at this point that the project builds its momentum and sets its course. Once actors publicly and politically commit to the project and vest their interests ‘on board,’ the tanker’s inertia builds up to a critical level, and even major interventions may only result in minor corrections to its course, as committed financial and political resources form a sort of inert obduracy that hinders rapid interventions. These closures are hugely consequential for the citizens of London, who not only bear the costs and inconveniences of the construction phase, but also the long-term burden of the problems that the project—through its narrow scope and both its financial and physical design—is unable to resolve. While some project costs—such as the climate costs of the construction project—are externalized into the future, other costs, such as the construction costs of the project are paid in the here and now—although the promised

benefits for the public (if any) are only expected at a later date. In both cases, the question of who bears the costs is obscured by opaque structures that shift the future liability from private investors to the public. Risk-averse investors maintain control over their future, while the future of the tax- and utility payer is put at risk through government taking on the ultimate financial responsibility for the project, as public utilities are often monopolies that are considered ‘too big to fail’. Moreover, considering the question of sustainability and the effects of climate change for London, the question of flooding and the lack of added benefits come to the fore. Long-term obligations and constraints, imposed on the city in order to fulfill TW’s needs for cost optimization, severely restrict public oversight and future room for maneuver.

The mechanisms outlined illustrate the immense political power with which finance permeates urban temporalities, and raise major questions: on the one hand, how to reclaim the power necessary to define the contemporary rhythms of the city; and on the other, how to generate a political voice for future generations. A higher degree of transparency and accountability are certainly part of the solution, as well as the political representation of those who actually bear the costs of today’s commitments. Temporal conflicts between states, citizens and private corporate actors illustrate how states and citizens have lost a certain amount of temporal authority (echoing Hope 2010). In this regard, financialization seemingly depoliticizes the process of urban infrastructure provision, as it constantly curtails the realm of influence that the public still holds over its utilities. This exemplifies how the social construction of time is negotiated within the city and how boundaries for future populations are put in place.

As Star (1999) noted, infrastructures are always innovated and built upon an existing infrastructural base, which both enables their formation but also constrains their form. In this sense, a description of the

temporal dynamics, solely focused on the increasing power of finance to define notions of time, falls short of portraying how the intricacies of financialized temporalities make space for openings. In particular, intersecting temporal dynamics provide windows for interventions; for example as poor governance practices are questioned in accordance with election cycles—particularly when they coincide, for instance, with times of financial turmoil. As we are witnessing a certain fatigue following failed privatizations and the longer-term fallout from such deals, as well as a changing political climate toward less liberal policies, the recomunalization of urban infrastructure assets might inspire cities across continental Europe (Beveridge and Naumann 2014). To be sure, in the case of the TTT, the window of opportunity that opened up with the concurrence of a wider awareness of its production and the news of its possible redundancy, did not (yet) result in changes of the project. However, more could be learned from analyzing the temporalities of more successful struggles against financialization. Consider, for instance, recent efforts of Berliners to reverse the privatization and financialization of the city's rental housing sector (Uffer 2014). In the past years, longstanding struggles of social movements to contest housing financialization have concurred with the election of a centre-left coalition and the increasing frustration of a majority of Berliners with the city's rising rents to facilitate the establishment of a rent cap and put a halt to the extraction of financial profits from the city's housing stock (*Guardian*, October 22, 2019). Thereby, the temporal infrastructure of election cycles, the routine work of bureaucracies and the long tradition of housing protest came together in ways that opened a window of opportunity to enact political change. In sum, these moments of openings and closures expose how polychronous temporalities add up to more than just the sum of their parts: they constitute an infrastructure of urban time, in which financialization need not play the dominant part.

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Notes

- 1 Projected cost at the time of writing.
- 2 The spillovers tend to occur when minimal rainfall is channeled into the sewer system by London's impervious surfaces. Construction is ongoing and the total cost is estimated at £4.2 billion.
- 3 Published in 2005, it concludes that out of the four possible strategies of (1) adoption of source control and sustainable urban drainage; (2) separation of foul and surface drainage and local storage; (3) screening, storage, or treatment at the discharge point to river; and (4) in-river treatment, only the third option would be able to achieve the environmental objectives.
- 4 However, politicians such as Boris Johnson (then Mayor of London) did not shy away from capitalizing on positive publicity associated with ribbon-cutting ceremonies such as that at the Lee Tunnel in 2016.
- 5 This is most apparent in TW's highly leveraged balance sheet, with an 80/20 debt-to-equity ratio, increasingly exposing the company to market volatility and shareholder interests.
- 6 An important aspect of this model is the discrepancy between Ofwat's cost of capital calculations vis-à-vis TW's own calculations, which assume a higher level of debt, thus benefiting their profits. Moreover, the RAB model creates flawed funding commitments that introduce financial inefficiencies by failing to provide the whole project funding at the onset of construction. The model also fails to evaluate issues beyond the horizon of bond finance, as impacts relating to environmental, climatic and social dynamics are not considered.

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